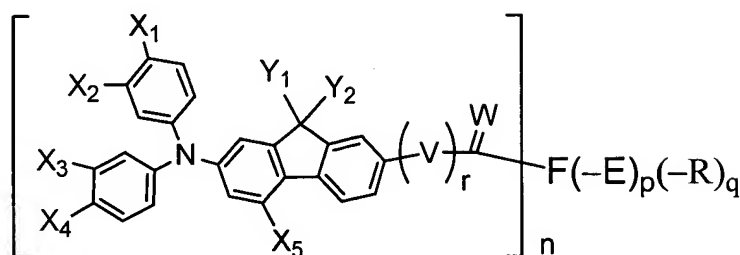


WHAT IS CLAIMED IS:

1. A compound of the following formula:



wherein

F is a fullerene core;

E is Y₁,Y₂-amino, Y₂-amino, (Y₁,Y₂-alkyl)-amino, Y₁,Y₂-ethylenediamino, (dihydroxymethyl)alkylamino, (X₁,X₃-aryl)amino, X₁,X₃-aryloxy, Y₂-alkoxy, Y₁,Y₂-alkoxy, (Y₁,Y₂-amino)alkoxy, (Y₁,Y₂,Y₃-aryl)oxy, (dihydroxyalkyl)-aryloxy, (Y₁,Y₂,Y₃-alkyl)amino, (Y₁,Y₂,Y₃-aryl)amino, dihydroxyalkylamino, Y₁,Y₂,Y₃-alkoxy, (trihydroxyalkyl)alkoxy, (trihydroxyalkyl)alkylamino, (dicarboxyalkyl)amino, Y₂-thio, (Y₁,Y₂,Y₃-alkyl)thio, (X₁,X₃-aryl)thio, (Y₁,Y₂-alkyl)thio, (dihydroxyalkyl)thio, Y₁,Y₂-dioxoalkyl, tri-(Y₁,Y₂,Y₃-methylaminocarboxyethyl)methylamino, ((glycosidyl)oxoheteroaryl)amino, ((glycosidyl)oxoaryl)amino, (X₁,X₂,X₃-heteroaryl)amino, (X₁-diarylketone)amino, (T,X₁-oxoaryl)amino, (T,X₁-dioxoaryl)amino, (Y₁-alkyl,Y₂-alkyldioxoheteroaryl)amino, (Y₁-alkyl,Y₂-alkyldioxoaryl)amino, (di(Y₁,Y₂-methyl)dioxoheteroaryl)amino, (di(Y₁,Y₂-methyl)dioxoaryl)amino, ((glycosidyl)heteroaryl)amino, ((glycosidyl)aryl)amino, ((carboxylacetylalkyl)oxo-heteroaryl)amino, ((carboxylacetylalkyl)oxoaryl)amino, ((isopropylaminohydroxy-alkoxy)aryl)amino, (X₁,X₂,X₃-alkylaryl)amino, (X₁,X₂,X₃-heteroaryl)oxy, (isopropylaminohydroxyalkyl)aryloxy, (X₁,X₂,X₃-oxoheteroaryl)oxy, (X₁,X₂,X₃-oxoaryl)oxy, (X₁,Y₁-oxoheteroaryl)oxy, (X₁-diarylketone)oxy, (T,X₁-oxoaryl)oxy, (X₁,X₂-dioxoaryl)oxy, (Y₁,Y₂,di-aminodihydroxy)alkyl, (X₁,X₂-heteroaryl)thio, ((tricarboxylalkyl)ethylene-diamino)alkoxy, (X₁,X₂-oxoaryl)thio, (X₁,X₂-dioxoaryl)thio, (glycosidylheteroaryl)thio, (glycosidylaryl)thio, Y₁-alkyl(thiocarbonyl)thio, Y₁,Y₂-alkyl(thiocarbonyl)thio, Y₁,Y₂,Y₃-alkyl(thiocarbonyl)thio, (Y₁,Y₂-aminothiocarbonyl)thio, (pyranosyl)thio, cysteinyl, tyrosinyl, (phenylalanyl)amino, (dicarboxyalkyl)thio, (aminoaryl)₁₋₁₀₀amino, (pyranosyl)₁₋₁₀₀amino, (Y₁-aminoaryl)₁₋₁₀₀amino,

(amino(sulfoaryl))₁₋₁₀₀amino, peptidyl, thymidinyl, uridinyl, guanosinyl, adenosinyl, cholesteryl, or biotinylalkoxy; each T, independently, being halo;

each of X₁, X₂, X₃, X₄, and X₅, independently, is -Y₂, -O-Y₂, -S-Y₂, -NH-Y₂, -CO-O-Y₂, -O-CO-Y₂, -CO-NH-Y₂, -CO-NY₁Y₂, -NH-CO-Y₂, -SO₂-Y₂, -SO₂-O-Y₂, -CHY₁Y₂, or -NY₁Y₂;

each of Y₁, Y₂, and Y₃, independently or taken together, is -B-Z or -Z; in which each B, independently, is -R^a-O-[Si(CH₃)₂-O-]₁₋₁₀₀, C₁₋₂₀₀₀ alkyl, C₆₋₄₀ aryl, C₇₋₂₀₀₀ alkylaryl, C₇₋₂₀₀₀ arylalkyl, (C₁₋₃₀ alkyl ether)₁₋₁₀₀, (C₆₋₄₀ aryl ether)₁₋₁₀₀, (C₇₋₂₀₀₀ alkylaryl ether)₁₋₁₀₀, (C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀, (C₁₋₃₀ alkyl thioether)₁₋₁₀₀, (C₆₋₄₀ aryl thioether)₁₋₁₀₀, (C₇₋₂₀₀₀ alkylaryl thioether)₁₋₁₀₀, (C₇₋₂₀₀₀ arylalkyl thioether)₁₋₁₀₀, (C₂₋₅₀ alkyl ester)₁₋₁₀₀, (C₇₋₂₀₀₀ aryl ester)₁₋₁₀₀, (C₈₋₂₀₀₀ alkylaryl ester)₁₋₁₀₀, (C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀, -R^a-CO-O-(C₁₋₃₀ alkyl ether)₁₋₁₀₀, -R^a-CO-O-(C₆₋₄₀ aryl ether)₁₋₁₀₀, -R^a-CO-O-(C₇₋₂₀₀₀ alkylaryl ether)₁₋₁₀₀, -R^a-CO-O-(C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀, (C₄₋₅₀ alkyl urethane)₁₋₁₀₀, (C₁₄₋₆₀ aryl urethane)₁₋₁₀₀, (C₁₀₋₂₀₀₀ alkylaryl urethane)₁₋₁₀₀, (C₁₀₋₂₀₀₀ arylalkyl urethane)₁₋₁₀₀, (C₅₋₅₀ alkyl urea)₁₋₁₀₀, (C₁₄₋₆₀ aryl urea)₁₋₁₀₀, (C₁₀₋₂₀₀₀ alkylaryl urea)₁₋₁₀₀, (C₁₀₋₂₀₀₀ arylalkyl urea)₁₋₁₀₀, (C₂₋₅₀ alkyl amide)₁₋₁₀₀, (C₇₋₆₀ aryl amide)₁₋₁₀₀, (C₈₋₂₀₀₀ alkylaryl amide)₁₋₁₀₀, (C₈₋₂₀₀₀ arylalkyl amide)₁₋₁₀₀, (C₃₋₃₀ alkyl anhydride)₁₋₁₀₀, (C₈₋₅₀ aryl anhydride)₁₋₁₀₀, (C₉₋₂₀₀₀ alkylaryl anhydride)₁₋₁₀₀, (C₉₋₂₀₀₀ arylalkyl anhydride)₁₋₁₀₀, (C₂₋₃₀ alkyl carbonate)₁₋₁₀₀, (C₇₋₅₀ aryl carbonate)₁₋₁₀₀, (C₈₋₂₀₀₀ alkylaryl carbonate)₁₋₁₀₀, (C₈₋₂₀₀₀ arylalkyl carbonate)₁₋₁₀₀, -R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₁₋₃₀ alkyl ether, C₆₋₄₀ aryl ether, C₇₋₂₀₀₀ alkylaryl ether, or C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀, -R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₂₋₅₀ alkyl ester, C₇₋₆₀ aryl ester, C₈₋₂₀₀₀ alkylaryl ester, or C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀, -R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₁₋₃₀ alkyl ether, C₆₋₄₀ aryl ether, C₇₋₂₀₀₀ alkylaryl ether, or C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-, -R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₂₋₅₀ alkyl ester, C₇₋₆₀ aryl ester, C₈₋₂₀₀₀ alkylaryl ester, or C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀-R^c-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-, -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₁₋₃₀ alkyl ether, C₆₋₄₀ aryl ether, C₇₋₂₀₀₀ alkylaryl ether, or C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀, -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₂₋₅₀ alkyl ester, C₇₋₆₀ aryl ester, C₈₋₂₀₀₀ alkylaryl ester, or C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀, -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₁₋₃₀ alkyl ether, C₆₋₄₀ aryl ether, C₇₋₂₀₀₀ alkylaryl ether, or C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-, -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₂₋₅₀ alkyl ester, C₇₋₆₀ aryl ester, C₈₋₂₀₀₀

alkylaryl ester, or C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀-R^c-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-,
-R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-NH-(C₂₋₅₀ alkyl amide, C₇₋₆₀ aryl amide, C₈₋₂₀₀₀
alkylaryl amide, or C₈₋₂₀₀₀ arylalkyl amide)₁₋₁₀₀, or -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-
CO-NH-(C₂₋₅₀ alkyl amide, C₇₋₆₀ aryl amide, C₈₋₂₀₀₀ alkylaryl amide, or C₈₋₂₀₀₀ arylalkyl
amide)₁₋₁₀₀; and each Z, independently, is -H or -G-D, wherein G is -R^a-, -R^a-Ar-, -Ar-R^a-, or
-Ar-; and D is -H, -OH, -SH, -NH₂, -NHOH, -SO₃H, -OSO₃H, -CO₂H, -CONH₂,
-CONHNH₂, -CH(NH₂)-CO₂H, -NH-CH₂-CO₂H, -P(OH)₃, -PO(OH)₂, -O-PO(OH)₂, -O-
PO(OH)-O-PO(OH)₂, -O-PO(O⁻)-O-CH₂CH₂NH₃⁺, -O-PO(O⁻)-O-CH₂CH₂-N⁺(CH₃)₃, -
glycoside, -oligosaccharide, -CO-glycoside, -CO-oligosaccharide, -OCH₃, -OCH₂(CHOH)₄-
CH₂OH, -OCH₂(CHOH)₂-CH₂OH, -CO-OCH₂(CHOH)₄-CH₂OH, -C₆H₃(OH)₂,
-N(CH₂CO₂H)₂, -CO-N(CH₂CO₂H)₂, -CO-NH-C(CH₂CH₂CO₂H)₃, -CO-NH-
C(CH₂CH₂OH)₃, -[CH₂-CH(CO₂R^a)]₁₋₁₀₀-H, -NH₃⁺, -N⁺H₂R^a, -N⁺HR^aR^b, or -N⁺R^aR^bR^c; each
of R^a, R^b, and R^c, independently, being C₁₋₂₀ linear or branched alkyl, and Ar being aryl;

R is hydroxy or amino;

W is O, C(CN)₂, N⁺Y₁Y₂, or V;

V is C₅₋₂₀ aryl or C₂₋₂₀ heteroaryl;

n is 1-10;

p is 0-20;

q is 0-20; and

r is 0 or 1.

2. The compound of claim 1, wherein F is a fullerene core of C₆₀, C₇₀, C₇₆, C₇₈, C₈₂, C₈₄, C₉₂
(methano)_nC₆₀, (pyrrolidino)_nC₆₀, La@C_s, Ho@C_s, Gd@C_s, or Er@C_s, in which n is 1-10,
and s is 60, 74, or 82.

3. The compound of claim 2, wherein F is a fullerene core of C₆₀, C₇₀, or C₈₄.

4. The compound of claim 1, wherein each of X₁, X₂, X₃, X₄, and X₅, independently, is
hydrogen.

5. The compound of claim 1, wherein each of Y₁, Y₂, and Y₃, independently, is hydrogen, C₁₋₂₀₀₀ alkyl, C₆₋₄₀ aryl, or C₇₋₂₀₀₀ arylalkyl, optionally substituted with -OH, -SH, -NH₂, -NHOH, -SO₃H, -OSO₃H, -CO₂H, -CONH₂, -CONHNH₂, -CH(NH₂)-CO₂H, -NH-CH₂-CO₂H, -NH₃⁺, -N⁺H₂R^a, -N⁺HR^aR^b, or -N⁺R^aR^bR^c,

6. The compound of claim 1, wherein each of Y₁, Y₂, and Y₃, independently, is ethyl, hydroxyethyl, methoxyethyl, sulfonylbutoxyethyl, hydroxycarbonylmethyl, or hydroxycarbonylethyl.

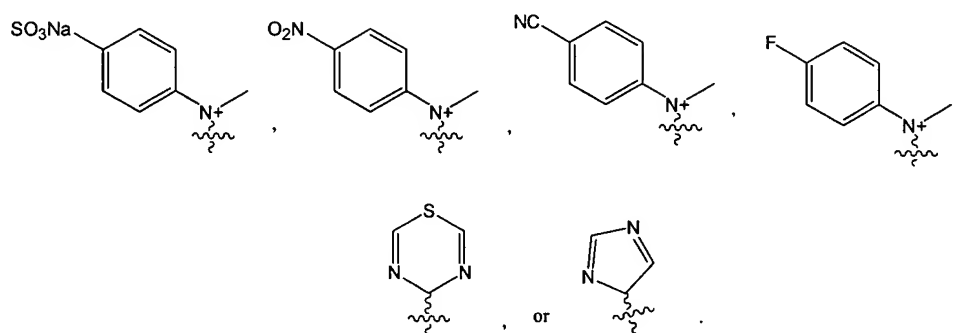
7. The compound of claim 1, wherein r is 0.

8. The compound of claim 1, wherein r is 1, and V is aryl.

9. The compound of claim 8, wherein V is phenyl.

10. The compound of claim 1, wherein W is O, C(CN)₂, heteroaryl, N⁺Y₁Y₂, each of Y₁ and Y₂, independently, being hydrogen, alkyl, aryl, or heteroaryl, or, together, being aryl or heteroaryl.

11. The compound of claim 10, wherein W is O, C(CN)₂,



12. The compound of claim 1, wherein E is Y₁,Y₂-amino, Y₂-amino, (Y₁,Y₂-alkyl)-amino, Y₁,Y₂-ethylenediamino, (dihydroxymethyl)alkylamino, (X₁,X₃-aryl)amino, (Y₁,Y₂,Y₃-alkyl)amino, (Y₁,Y₂,Y₃-aryl)amino, dihydroxyalkylamino, (trihydroxyalkyl)alkylamino, or (dicarboxyalkyl)amino; and p is 1-4.

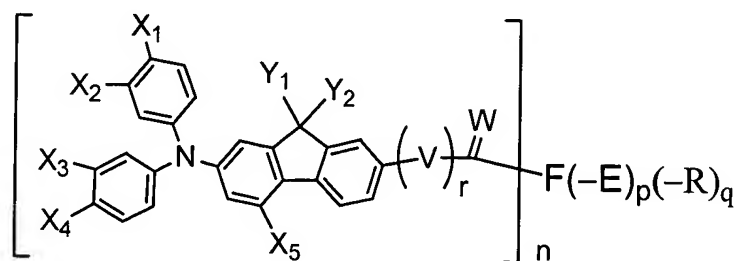
14. The compound of claim 1, wherein R is hydroxy or amino.

15. The compound of claim 1, wherein q is 0.

16. The compound of claim 1, wherein the compound is of the following structure of $F(-M)_n$, in which F is a fullerene core of C_{60} , n is 1-6, each M, independently, is



17. A pharmaceutical composition, comprising a pharmaceutically acceptable carrier and a compound of the following formula:



wherein

F is a fullerene core;

E is Y₁,Y₂-amino, Y₂-amino, (Y₁,Y₂-alkyl)-amino, Y₁,Y₂-ethylenediamino, (dihydroxymethyl)alkylamino, (X₁,X₃-aryl)amino, X₁,X₃-aryloxy, Y₂-alkoxy, Y₁,Y₂-alkoxy, (Y₁,Y₂-amino)alkoxy, (Y₁,Y₂,Y₃-aryl)oxy, (dihydroxyalkyl)-aryloxy, (Y₁,Y₂,Y₃-alkyl)amino, (Y₁,Y₂,Y₃-aryl)amino, dihydroxyalkylamino, Y₁,Y₂,Y₃-alkoxy, (trihydroxyalkyl)alkoxy, (trihydroxyalkyl)alkylamino, (dicarboxyalkyl)amino, Y₂-thio, (Y₁,Y₂,Y₃-alkyl)thio, (X₁,X₃-aryl)thio, (Y₁,Y₂-alkyl)thio, (dihydroxyalkyl)thio, Y₁,Y₂-dioxoalkyl, tri-(Y₁,Y₂,Y₃-methylaminocarboxyethyl)methylamino, ((glycosidyl)oxoheteroaryl)amino, ((glycosidyl)oxoaryl)amino, (X₁,X₂,X₃-heteroaryl)amino, (X₁-diarylketone)amino, (T,X₁-oxoaryl)amino, (T,X₁-dioxoaryl)amino, (Y₁-alkyl,Y₂-alkyldioxoheteroaryl)amino, (Y₁-alkyl,Y₂-alkyldioxoaryl)amino, (di(Y₁,Y₂-methyl)dioxoheteroaryl)amino, (di(Y₁,Y₂-methyl)dioxoaryl)amino, ((glycosidyl)heteroaryl)amino, ((glycosidyl)aryl)amino, ((carboxylacetylalkyl)oxo-heteroaryl)amino, ((carboxylacetylalkyl)oxoaryl)amino, ((isopropylaminohydroxy-alkoxy)aryl)amino, (X₁,X₂,X₃-alkylaryl)amino, (X₁,X₂,X₃-heteroaryl)oxy, (isopropylaminohydroxyalkyl)aryloxy, (X₁,X₂,X₃-oxoheteroaryl)oxy, (X₁,X₂,X₃-oxoaryl)oxy, (X₁,Y₁-oxoheteroaryl)oxy, (X₁-diarylketone)oxy, (T,X₁-oxoaryl)oxy, (X₁,X₂-dioxoaryl)oxy, (Y₁,Y₂,di-aminodihydroxy)alkyl, (X₁,X₂-heteroaryl)thio, ((tricarboxylalkyl)ethylene-diamino)alkoxy, (X₁,X₂-oxoaryl)thio, (X₁,X₂-dioxoaryl)thio, (glycosidylheteroaryl)thio, (glycosidylaryl)thio, Y₁-alkyl(thiocarbonyl)thio, Y₁,Y₂-alkyl(thiocarbonyl)thio, Y₁,Y₂,Y₃-alkyl(thiocarbonyl)thio, (Y₁,Y₂-aminothiocarbonyl)thio, (pyranosyl)thio, cysteinyl, tyrosinyl, (phenylalanyl)amino, (dicarboxyalkyl)thio, (aminoaryl)₁₋₁₀₀amino, (pyranosyl)₁₋₁₀₀amino, (Y₁-aminoaryl)₁₋₁₀₀amino,

(amino(sulfoaryl))₁₋₁₀₀amino, peptidyl, thymidinyl, uridinyl, guanosinyl, adenosinyl, cholesteryl, or biotinylalkoxy; each T, independently, being halo;

each of X₁, X₂, X₃, X₄, and X₅, independently, is -Y₂, -O-Y₂, -S-Y₂, -NH-Y₂, -CO-O-Y₂, -O-CO-Y₂, -CO-NH-Y₂, -CO-NY₁Y₂, -NH-CO-Y₂, -SO₂-Y₂, -SO₂-O-Y₂, -CHY₁Y₂, or -NY₁Y₂;

each of Y₁, Y₂, and Y₃, independently or taken together, is -B-Z or -Z; in which each B, independently, is -R^a-O-[Si(CH₃)₂-O-]₁₋₁₀₀, C₁₋₂₀₀₀ alkyl, C₆₋₄₀ aryl, C₇₋₂₀₀₀ alkylaryl, C₇₋₂₀₀₀ arylalkyl, (C₁₋₃₀ alkyl ether)₁₋₁₀₀, (C₆₋₄₀ aryl ether)₁₋₁₀₀, (C₇₋₂₀₀₀ alkylaryl ether)₁₋₁₀₀, (C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀, (C₁₋₃₀ alkyl thioether)₁₋₁₀₀, (C₆₋₄₀ aryl thioether)₁₋₁₀₀, (C₇₋₂₀₀₀ alkylaryl thioether)₁₋₁₀₀, (C₇₋₂₀₀₀ arylalkyl thioether)₁₋₁₀₀, (C₂₋₅₀ alkyl ester)₁₋₁₀₀, (C₇₋₂₀₀₀ aryl ester)₁₋₁₀₀, (C₈₋₂₀₀₀ alkylaryl ester)₁₋₁₀₀, (C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀, -R^a-CO-O-(C₁₋₃₀ alkyl ether)₁₋₁₀₀, -R^a-CO-O-(C₆₋₄₀ aryl ether)₁₋₁₀₀, -R^a-CO-O-(C₇₋₂₀₀₀ alkylaryl ether)₁₋₁₀₀, -R^a-CO-O-(C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀, (C₄₋₅₀ alkyl urethane)₁₋₁₀₀, (C₁₄₋₆₀ aryl urethane)₁₋₁₀₀, (C₁₀₋₂₀₀₀ alkylaryl urethane)₁₋₁₀₀, (C₁₀₋₂₀₀₀ arylalkyl urethane)₁₋₁₀₀, (C₅₋₅₀ alkyl urea)₁₋₁₀₀, (C₁₄₋₆₀ aryl urea)₁₋₁₀₀, (C₁₀₋₂₀₀₀ alkylaryl urea)₁₋₁₀₀, (C₁₀₋₂₀₀₀ arylalkyl urea)₁₋₁₀₀, (C₂₋₅₀ alkyl amide)₁₋₁₀₀, (C₇₋₆₀ aryl amide)₁₋₁₀₀, (C₈₋₂₀₀₀ alkylaryl amide)₁₋₁₀₀, (C₈₋₂₀₀₀ arylalkyl amide)₁₋₁₀₀, (C₃₋₃₀ alkyl anhydride)₁₋₁₀₀, (C₈₋₅₀ aryl anhydride)₁₋₁₀₀, (C₉₋₂₀₀₀ alkylaryl anhydride)₁₋₁₀₀, (C₉₋₂₀₀₀ arylalkyl anhydride)₁₋₁₀₀, (C₂₋₃₀ alkyl carbonate)₁₋₁₀₀, (C₇₋₅₀ aryl carbonate)₁₋₁₀₀, (C₈₋₂₀₀₀ alkylaryl carbonate)₁₋₁₀₀, (C₈₋₂₀₀₀ arylalkyl carbonate)₁₋₁₀₀, -R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₁₋₃₀ alkyl ether, C₆₋₄₀ aryl ether, C₇₋₂₀₀₀ alkylaryl ether, or C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀, -R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₂₋₅₀ alkyl ester, C₇₋₆₀ aryl ester, C₈₋₂₀₀₀ alkylaryl ester, or C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀, -R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₁₋₃₀ alkyl ether, C₆₋₄₀ aryl ether, C₇₋₂₀₀₀ alkylaryl ether, or C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-, -R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₂₋₅₀ alkyl ester, C₇₋₆₀ aryl ester, C₈₋₂₀₀₀ alkylaryl ester, or C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀-R^c-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-, -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₁₋₃₀ alkyl ether, C₆₋₄₀ aryl ether, C₇₋₂₀₀₀ alkylaryl ether, or C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀, -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₂₋₅₀ alkyl ester, C₇₋₆₀ aryl ester, C₈₋₂₀₀₀ alkylaryl ester, or C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀, -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₁₋₃₀ alkyl ether, C₆₋₄₀ aryl ether, C₇₋₂₀₀₀ alkylaryl ether, or C₇₋₂₀₀₀ arylalkyl ether)₁₋₁₀₀-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-, -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C₂₋₅₀ alkyl ester, C₇₋₆₀ aryl ester, C₈₋₂₀₀₀

alkylaryl ester, or C₈₋₂₀₀₀ arylalkyl ester)₁₋₁₀₀-R^c-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-,
-R^a-O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-NH-(C₂₋₅₀ alkyl amide, C₇₋₆₀ aryl amide, C₈₋₂₀₀₀
alkylaryl amide, or C₈₋₂₀₀₀ arylalkyl amide)₁₋₁₀₀, or -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-
CO-NH-(C₂₋₅₀ alkyl amide, C₇₋₆₀ aryl amide, C₈₋₂₀₀₀ alkylaryl amide, or C₈₋₂₀₀₀ arylalkyl
amide)₁₋₁₀₀; and each Z, independently, is -H or -G-D, wherein G is -R^a-, -R^a-Ar-, -Ar-R^a-, or
-Ar-; and D is -H, -OH, -SH, -NH₂, -NHOH, -SO₃H, -OSO₃H, -CO₂H, -CONH₂,
-CONHNH₂, -CH(NH₂)-CO₂H, -NH-CH₂-CO₂H, -P(OH)₃, -PO(OH)₂, -O-PO(OH)₂, -O-
PO(OH)-O-PO(OH)₂, -O-PO(O⁻)-O-CH₂CH₂NH₃⁺, -O-PO(O⁻)-O-CH₂CH₂-N⁺(CH₃)₃,
-glycoside, -oligosaccharide, -CO-glycoside, -CO-oligosaccharide, -OCH₃, -OCH₂(CHOH)₄-
CH₂OH, -OCH₂(CHOH)₂-CH₂OH, -CO-OCH₂(CHOH)₄-CH₂OH, -C₆H₃(OH)₂,
-N(CH₂CO₂H)₂, -CO-N(CH₂CO₂H)₂, -CO-NH-C(CH₂CH₂CO₂H)₃, -CO-NH-
C(CH₂CH₂OH)₃, -[CH₂-CH(CO₂R^a)]₁₋₁₀₀-H, -NH₃⁺, -N⁺H₂R^a, -N⁺HR^aR^b, or -N⁺R^aR^bR^c, each
of R^a, R^b, and R^c, independently, being C₁₋₂₀ linear or branched alkyl, and Ar being aryl;

R is alkyl, hydroxy, or amino;

W is O, C(CN)₂, N⁺Y₁Y₂, or V;

V is C₅₋₂₀ aryl or C₂₋₂₀ heteroaryl;

n is 1-10;

p is 0-20;

q is 0-20; and

r is 0 or 1.

18. The pharmaceutical composition of claim 17, wherein wherein F is a fullerene core of
C₆₀, C₇₀, C₇₆, C₇₈, C₈₂, C₈₄, C₉₂ (methano)_nC₆₀, (pyrrolidino)_nC₆₀, La@C_s, Ho@C_s,
Gd@C_s, or Er@C_s, in which n is 1-10, and s is 60, 74, or 82.

19. The pharmaceutical composition of claim 17, wherein each of X₁, X₂, X₃, X₄, and X₅,
independently, is hydrogen.

20. The pharmaceutical composition of claim 17, wherein the compound is of the following
structure of F(-M)_n, in which F is a fullerene core of C₆₀, n is 1-6, each M, independently,
is:

